

# Multiprocessing Operating System

Multitasking works by rapidly switching the CPU's attention between different processes. This creates the illusion of parallelism, but in reality, only one process is actively using the CPU at any given instant. With multitasking, the CPU becomes a bottleneck. As the number of processes increases, the CPU spends more time switching between them, and the performance of individual processes can suffer.

- **Multitasking:** Allows multiple processes to run concurrently on a single processor by rapidly switching between them.

Eg : The chef quickly switches between the dishes, stirring one, chopping vegetables for another, and so on. It seems like they're cooking everything at once, but they're really just working on one dish at a time.

- **Multiprocessing:** Allows multiple processes to run concurrently on multiple processors, enabling true parallel execution.

Eg : Now imagine the chef has helpers (multiple cores/CPU's). Each helper can work on a different dish simultaneously. This allows the kitchen to produce food much faster.

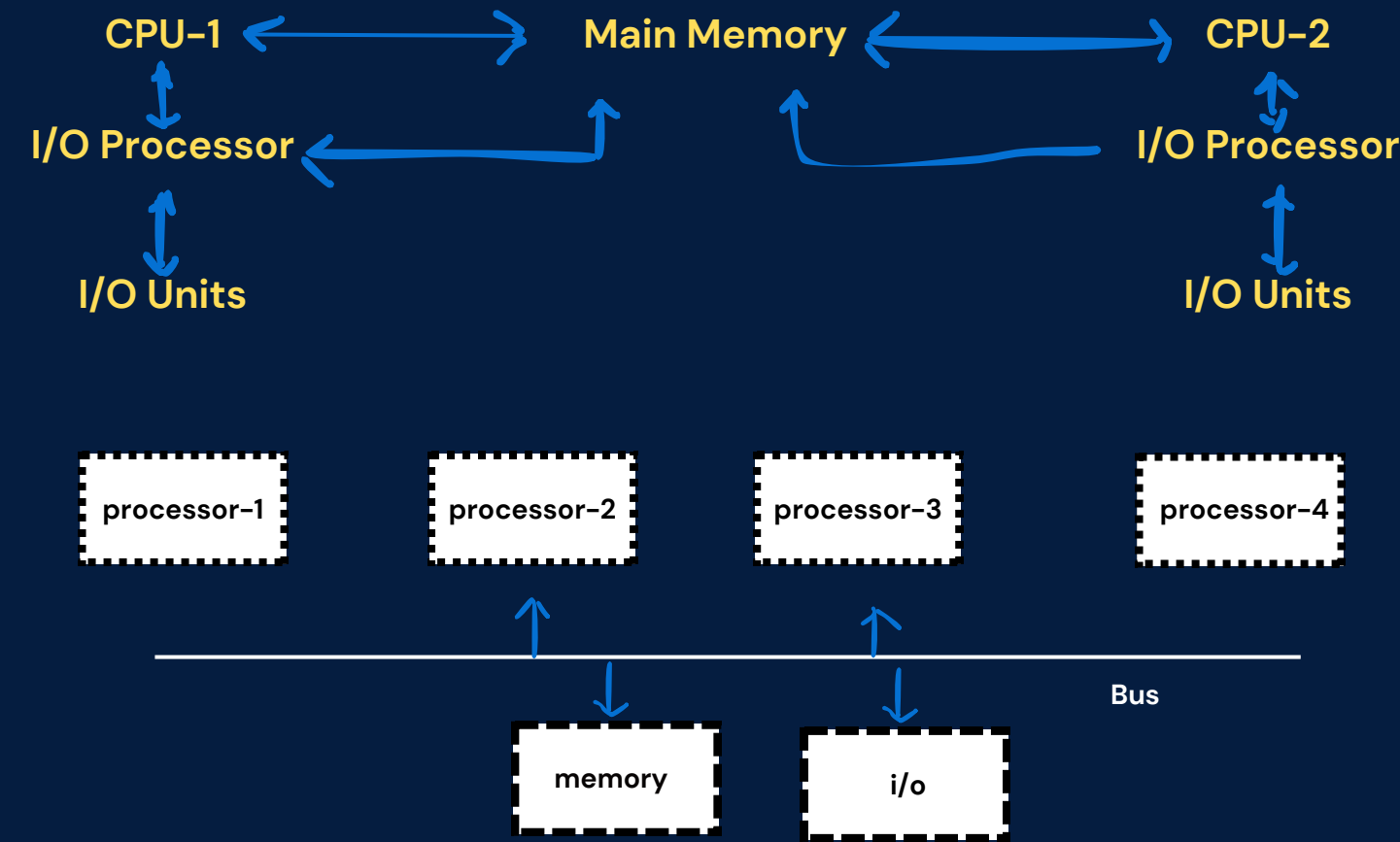
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A **Multiprocessing Operating System** is an OS that supports multiple CPUs (or cores) working simultaneously to execute multiple processes in parallel within a single computer system. Unlike a single-processor system, where only one process runs at a time, multiprocessing OS distribute the workload among multiple processors, improving performance and efficiency.

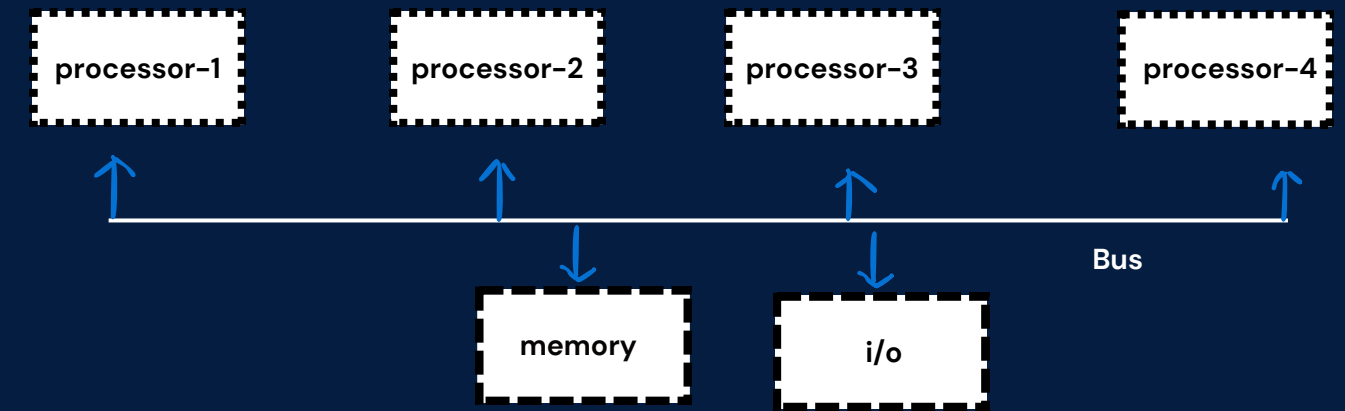
Eg : UNIX, Linux, Windows Server, macOS

## Key Characteristics:

- **Multiple CPUs:** The system has more than one processing unit, allowing for true parallel execution.
- **Shared Resources:** Processors often share resources like memory and I/O devices.
- **Coordination:** The OS must coordinate the activities of the different processors to ensure proper execution and prevent conflicts.



# Multiprocessing Operating Systems



Types of Multiprocessing:

1. **Symmetric Multiprocessing (SMP):** All processors are treated equally.

- Each processor runs the same copy of the OS.
- Processors can share memory and I/O devices.
- This is the most common type of multiprocessing.
- Any processor can perform any task

2. **Asymmetric Multiprocessing (AMP):** One processor is designated as the "master" and controls the other processors ("slaves").

- The master processor assigns tasks to the slaves.
- This approach can be simpler to implement but may create bottlenecks
- Task is divided according to processor role